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The Hepaticae of the Bahama Islands

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(WITH PLATES 9 AND 10)

Previous to 1903 no Hepaticae had been reported from the Bahama Islands. In that year a list of eight species was published by Coker* from determinations made by the writer. It was based on collections made in the vicinity of Nassau and includes six Lejeuneae and two species of *Frullania*. With a single exception the species listed are also known from Florida and all are common in the Antilles.

During the years 1904–1910 a botanical exploration of the Islands was carried on under the direction of the New York Botanical Garden. The collections made included many packets of Hepaticae and these also were sent to the writer for examination. They were found to contain twenty-six species which Coker did not list, thus raising the total number of species known from the Islands to thirty-four. Several Lejeuneae from these collections, including the new *Brachiolejeunea bahamensis*, have already been reported upon in other connections.

The most complete representation of Bahamian Hepaticae was secured by Mrs. Elizabeth G. Britton, who found twenty-six species on the island of New Providence alone. The other islands, only one of which was visited by Mrs. Britton, yielded much smaller collections, Andros leading with only eight species to its credit. It is of course probable that most of the forms now known from New Providence only are more or less widely distributed through-

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*In Shattuck: The Bahaman Islands 248. 1905.

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out the group, and that others still await discovery. The collections already made, however, show clearly the general characteristics of the hepatic flora.

The present paper includes a full report on the various specimens studied by the writer. Under each species the local distribution in the archipelago is given, together with notes on the general distribution. New or otherwise noteworthy species are treated more fully than the others and, in conclusion, the relationships of the Bahamian Hepaticae to those of neighboring regions are briefly discussed. Since many of the Lejeuneae listed have recently been studied critically by the writer, references are given to papers in which descriptions of such species may be found. No attempt is made, however, to treat the synonymy at length.

RICCIACEAE

1. RICCIELLA CRYSTALLINA (L.) Warnst.

On wet ground. New Providence: Barnett's Point, *Britton & Millspaugh* (*2627*). Widely distributed in North America, Europe, and Asia.

MARCHANTIACEAE

2. MARCHANTIA CHENOPODA L.

Along a drain. New Providence: Fort Charlotte, *Brace* (*3916*). Widely distributed in the American tropics. The Bahamian specimens are gemmiparous and show neither male nor female receptacles.

JUNGERMANNIACEAE

3. PLAGIOCHILA LUDOVICIANA Sulliv.

On bark. New Providence: Maidenhead Coppice, *E. G. Britton* (*253, 3221, 6555*). Florida to Louisiana.

4. RADULA AUSTRALIS Aust.

On bark. Andros: Nicholl's Town and vicinity, *Brace* (*6880*). New Providence: Maidenhead Coppice, *E. G. Britton* (*3261 p.p.*). Georgia and Florida. Recently reported from the Bahama Islands by Stephani.*

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*Species Hepat. 4: 216. 1910.

5. DIPLASIOLEJEUNEA RUDOLPHIANA Steph. Hedwigia **35**: 79. 1896.

On bark. New Providence: Soldiers Road, *Coker* (*1 p.p.*), *E. G. Britton* (*819 p.p., 820 p.p., 3255 p.p.*); Waterloo, *E. G. Britton* (*3 p.p.*); Rifle Range Coppice, *E. G. Britton* (*561 p.p.*); Lake Cunningham, *E. G. Britton* (*645 p.p.*); near Tea House, *E. G. Britton* (*3193 p.p.*). Florida; tropical America. Widely distributed but often confused with *D. unidentata* (Lehm. & Lindenb.) Schiffn. The species has already been listed under this name by Coker.

6. COLOLEJEUNEA JOORIANA (Aust.) Evans, Mem. Torrey Club **8**: 173. *pl. 22. f. 9–20.* 1902.

On bark. New Providence: Waterloo, *E. G. Britton* (*3 p.p.*). Crooked Island: Stopper Hill, *Brace* (*4816 p.p.*). North Carolina to Florida and Louisiana; Bermuda.

7. LEJEUNEA FLAVA (Swartz) Nees, Naturgesch. Eur. Leberm. **3**: 277. 1838.

Jungermannia flava Swartz, Prodr. Fl. Ind. Occ. 144. 1788.

Lejeunea Moorei Lindb. Acta Soc. Sc. Fenn. **10**: 487. 1875.

Lejeunea americana (Lindb.) Evans, Mem. Torrey Club **8**: 154. *pl. 20. f. 14–26.* 1902.*

On bark. New Providence: Waterloo, *E. G. Britton* (*765 p.p.*); Maidenhead Coppice, *E. G. Britton* (*6576 p.p.*). Widely distributed in tropical regions throughout the world; Ireland; Australia; North Carolina to Florida and westward to Texas.

A specimen of *Lejeunea flava* collected by Swartz in Jamaica is preserved in the herbarium of the British Museum and is doubtless to be considered a part of the original material. It agrees closely with the plants from various North American localities, which the writer has lately referred to *L. americana*. The latter species, therefore, as indicated above, must be reduced to synonymy. The specimens distributed in Hepaticae Spruceanae under the name *Eulejeunea flava* present a somewhat different appearance, but they are not very well preserved and can hardly give a clear idea of Spruce's interpretation of the species. In any case the epiphyllous plants which he described and distributed under the name *Eulejeunea albida* agree with Florida specimens of *L. flava* and therefore with Swartz's Jamaican specimens. It may be noted in this connection that the original material of *L. flava* was also epiphyllous, growing on the old leaves of ferns; the species, however, is even more common on bark.

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*Schiffner gives other synonyms in his Conspectus Hepaticarum Archipelagi Indici 249. 1898.

8. LEJEUNEA GLAUCESCENS Gottsche.

On bark. Great Bahama: Eight Mile Rocks, *Britton & Millspaugh* (*2587, 2609*). Cat Island: the Bight and vicinity, *Britton & Millspaugh* (*5872, 5873*). Tropical America; Florida; Bermuda. The Bahamian specimens are not very well developed but seem to be referable to this species.

9. MICROLEJEUNEA BULLATA (Tayl.) Evans, Mem. Torrey Club **8**: 164. *pl. 21. f. 20–29.* 1902.

On bark. New Providence: Soldiers Road, *Coker* (*15 p.p.*); Waterloo, *E. G. Britton* (*2*); Maidenhead Coppice, *E. G. Britton* (*3254 p.p.*); Carmichael, *E. G. Britton* (*443 p.p.*). Crooked Island: Stopper Hill, *Brace* (*4816 p.p.*). Tropical America; South Carolina; Florida.

10. MICROLEJEUNEA LAETEVIRENS (Nees & Mont.) Evans, Bryologist **11**: 68. 1908.

Microlejeunea lucens (Tayl.) Evans, Mem. Torrey Club **8**: 157. *pl. 21. f. 1–10.* 1902.

On bark. Abaco: Great Cistern, *Brace* (*1783*). Berry Islands: Lignum Vitae Cay, *Britton & Millspaugh* (*2325, 2327*). Andros: near Nicholl's Town, *Small & Carter* (*8966 p.p.*). New Providence, Mt. Vernon, *Coker* (*19*); Waterloo, *E. G. Britton* (*765 p.p., 6629 p.p.*); Maidenhead Coppice, *E. G. Britton* (*213 p.p., 3216, 3217 p.p., 3218, 3252 p.p., 3253, 3258, 3259, 6559, 6576 p.p.*); Lake Cunningham, *E. G. Britton* (*610 p.p.*); Carmichael, *E. G. Britton* (*443 p.p.*). Cat Island: Orange Creek and vicinity, *Britton & Millspaugh* (*5711*). Widely distributed in tropical America; Virginia; Florida to Louisiana.

11. RECTOLEJEUNEA BERTEROANA (Gottsche) Evans, Bull. Torrey Club **33**: 12. 1906.

Cheilolejeunea versifolia (Gottsche) Schiffn. Bot. Jahrb. **23**: 597. *pl. 5. f. 1–7.* 1897. Evans, Mem. Torrey Club **8**: 145. 1902.

On bark. New Providence: Soldiers Road, *E. G. Britton* (*824 p.p.*); Grantstown, *E. G. Britton* (*565 p.p.*). Cuba; Porto Rico; Florida.

12. **Rectolejeunea Brittoniae** sp. nov.

Yellowish green, becoming brownish with age, growing in depressed mats: stems about 0.08 mm. in diameter, sparingly and irregularly branched, the branches widely spreading, not microphyllous; rhizoids sparingly produced: leaves imbricated, the lobe plane or slightly convex (when moist), scarcely or not at all falcate, obliquely to widely spreading, broadly ovate to orbicular, averaging about 0.5×0.45 mm., arching partially or wholly across axis, antical margin outwardly curved from the base to the broad and rounded or very obtuse apex, postical margin slightly curved or almost straight, forming an almost continuous line with the keel or with a shallow indentation at the junction, margin slightly and irregularly crenulate from projecting cells, sometimes vaguely sinuate; lobule inflated throughout, triangular-ovate, about 0.1 mm. long and of the same width at the base, keel straight or very slightly arched, free margin curved and involute to or beyond the apex, apical tooth straight and slightly projecting, hyaline papilla in a distinct depression, sinus straight or nearly so, very short (two or three cells long); cells of lobe a little convex, averaging about 17μ at the margin, 25μ in the middle, and 30×25μ at the base, walls with indistinct triangular trigones and rarely with oval intermediate thickenings; ocelli none: underleaves distant to contiguous, orbicular, about 0.35 mm. long, bifid about one half, the divisions mostly acute but sometimes obtuse or even rounded, subcordate or rounded at the base, margin crenulate from projecting cells, sometimes indistinctly unidentate on the sides or vaguely sinuate: inflorescence dioicous: ♀ inflorescence sometimes borne on a short branch but usually on a leading branch, innovating on one side, rarely on both, the innovations often soon floriferous but sometimes sterile; bracts widely spreading, complicate, unequally bifid, keel sharp, sometimes very narrowly winged, lobe ovate to obovate, sometimes slightly falcate, maximum size about 0.6×0.4 mm., apex and margin as in the leaves, lobule narrowly ovate to ligulate, about 0.45×0.15 mm., the apex more or less pointed or bidentate; bracteole oblong, 0.5 mm. long, 0.4 mm. wide, tapering somewhat toward base and apex, bifid about one fourth with acute lobes and sinus, margin as in the underleaves; perianth about one third exserted, oblong to obovate, about 0.65 mm. long and 0.45 mm. wide, rounded to truncate at the apex with a short but distinct beak sometimes borne in a slight depression, slightly compressed in the upper part, antical surface plane or with a low keel, lateral keels sharp, postical keel two-angled, surface smooth or very slightly roughened from projecting cells: ♂ inflorescence terminal on a leading branch or on a short branch, sometimes occupying the entire length of a short branch, often proliferating; bracts mostly in two to six pairs, imbricated, inflated, subequally bifid with a strongly arched keel and rounded divisions; bracteoles extending the whole length of the inflorescence, similar to the underleaves but smaller and usually with more irregular margins; antheridia in pairs: capsule about 0.3 mm. in diameter; spores minutely verruculose, about 12 μ in short diameter; elaters about 7 μ wide. (PLATE 9, FIGURES 1–12.)

On bark. Great Bahama: edge of mangrove swamp, *Britton & Millspaugh* (*2717*). New Providence: Mt. Vernon, *Coker* (*4*); Soldiers Road, *Coker* (*1 p.p.*, *15 p.p.*), *E. G. Britton* (*692*, *817*, *821 p.p.*, *823 p.p.*, *3166*); Waterloo, *E. G. Britton* (*6598*, *6629 p.p.*, *6641*); Maidenhead Coppice, *E. G. Britton* (*210*, *3215 p.p.*, *3255 p.p.*, *3257 p.p.*, *6563*, *6564*, *6576 p.p.*); vicinity of Lake Cunningham, *N. L. Britton* (*110*), *E. G. Britton* (*609*, *610 p.p.*); near Tea House, *E. G. Britton* (*3193 p.p.*); Cleveland, *Mary Brace* (*4*); Grantstown; *E. G. Britton* (*569*); trail west to Southwest Landing, *E. G. Britton* (*468*); near Clifton, *E. G. Britton* (*739 p.p.*); Fox Hills Path, *Britton & Millspaugh* (*2091*). No. 692 may be designated the type. The species is included under *Cheilolejeunea phyllobola* in Coker's list.

In the various species of *Rectolejeunea* vegetative reproduction is accomplished by means of leaves which break away from the stems and branches and attach themselves to the substratum by scattered rhizoids. The latter grow out directly from marginal leaf cells and sometimes make their appearance before the leaves become separated. The deciduous leaves give rise to new leafy shoots by a process of regeneration. In most cases a leaf will bear but a single leafy shoot, although two or even three are occasionally developed. Apparently a shoot always arises from a marginal leaf cell.

In *R. flagelliformis* Evans,* of Cuba and Porto Rico, and also in *R. Berteroana* the deciduous leaves are strikingly modified and are borne on peculiar flagelliform branches with short internodes and limited growth. These branches spread at right angles to the substratum and give a very strange appearance to tufts where they occur abundantly. In *R. phyllobola* the deciduous leaves are less modified, and the shoots upon which they are borne develop internodes of the usual length and continue their growth for a longer period. Even here, however, the shoots acquire a characteristic appearance when a long series of leaves has fallen away leaving the underleaves behind. In *R. Brittoniae* the conditions are much the same as in *R. phyllobola*, the internodes being so long that the underleaves do not overlap. The modifications shown by the deciduous leaves, although slight, are not without interest. The lobes are smaller than on ordinary leaves, and the lobules are so reduced in size that they consist of only a few cells. The postical margins of the lobes are distinctly rounded at the base and form acute angles with the axis. The marginal crenulations are usually better marked than on normal leaves, but this difference is not always apparent. The separation takes place very close to the line of attachment, the basal cells being usually torn across. In all cases the rudimentary lobules are left behind. The leafy shoots which arise from the deciduous leaves, at first bear small and simple leaves, as in other members of the genus, but these soon increase in size and complexity with the further development of the shoot. The underleaves, as a rule, make their appearance very early. The tendency to develop shoots with deciduous leaves is much less marked in *R. Brittoniae* than in its allies, the majority of the plants forming normal shoots only.

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* Bull. Torrey Club **33**: 9. *pl. 1. f. 10–25.* 1906.

The relationship between *R. Brittoniae* and *R. phyllobola* is very close, the leaves, underleaves, and perianths being much alike in the two species. Even the leaf cells agree closely in structure and are very nearly equal in size. There are, however, two important differences: in *R. phyllobola* the inflorescence is autoicous, and the bracteoles of the antheridial spikes are restricted to the base, except of course when only one or two pairs of bracts are present; in *R. Brittoniae*, on the other hand, the inflorescence is dioicous, and the bracteoles are found along the whole length of the antheridial spikes. The species is also a little more robust than *R. phyllobola*, and the underleaves are larger and have broader and usually blunter divisions; in *R. phyllobola*, for example, the divisions are often tipped with two superimposed cells, a condition which is exceedingly rare in *R. Brittoniae.* Unfortunately, in sterile material, the various parts tend to be poorly or abnormally developed, so that it is sometimes difficult to make a positive determination.

13. RECTOLEJEUNEA PHYLLOBOLA (Nees & Mont.) Evans, Bull. Torrey Club **33**: 15. 1906.

Cheilolejeunea phyllobola Schiffn. Evans, Mem. Torrey Club **8**: 143. *pl. 20. f. 1–13.* 1902.

On bark and rocks. Great Bahama: West End, *Brace* (*3607*). Berry Islands: Lignum Vitae Cay, *Britton & Millspaugh* (*2323*). Andros: road to Morgan's Bluff, *Brace* (*6684*). New Providence: Soldiers Road, *Coker* (*6*); Carmichael, *E. G. Britton* (*442*). Eleuthera: caves near the Bluff, *E. G. Britton* (*6518*). Cat Island: Port Howe and vicinity, *Britton & Millspaugh* (*5972*). Watlings Island: Cockburn Town and vicinity, *Britton & Millspaugh* (*6125*, *6134 p.p.*). Tropical North America; Florida; Bermuda.

14. CHEILOLEJEUNEA DECIDUA (Spruce) Evans, Bull. Torrey Club **33**: 6. *pl. 1. f. 1–9.* 1906.

On logs. Andros: near Nicholl's Town, *Small & Carter* (*8925a p.p.*). Florida; Porto Rico; Brazil.

15. EUOSMOLEJEUNEA CLAUSA (Nees & Mont.) Evans, Bryologist **11**: 69. 1908.

Euosmolejeunea opaca (Gottsche) Steph. Evans, Mem. Torrey Club **8**: 139. *pl. 19. f. 1–11.* 1902.

On logs. New Providence: Soldiers Road, *E. G. Britton* (*3170*). Widely distributed in tropical America; Florida and Alabama; Bermuda.

16. EUOSMOLEJEUNEA DURIUSCULA (Nees) Evans, Mem. Torrey Club **8**: 135. *pl. 18. f. 12–23.* 1902.

On bark, rarely on rocks. Abaco: Marsh Harbor, *Brace* (*1816*). Andros: near Nicholl's Town, *Small & Carter* (*8966 p.p.*). New Providence: Soldiers Road, *E. G. Britton* (*823 p.p.*, *165 p.p.*, *3171*); Maidenhead Coppice, *E. G. Britton* (*256 p.p.*, *3251*, *3252 p.p.*, *6555a*, *6556*); Grantstown, *E. G. Britton* (*558*); coppice near Race Course, *E. G. Britton* (*3419*); north slope of Blue Hills, *E. G. Britton* (*584 p.p.*). Widely distributed in tropical America; Florida to Louisiana.

17. EUOSMOLEJEUNEA TRIFARIA (Nees) Schiffn. Evans, Bull. Torrey Club **30**: 558. *pl. 22. f. 1–10.* 1903.

On logs. New Providence: Soldiers Road, *E. G. Britton* (*825*); Waterloo, *E. G. Britton* (*6631*). Widely distributed in tropical regions throughout the world.

18. CERATOLEJEUNEA CUBENSIS (Mont.) Schiffn.

On logs. Andros: near Nicholl's Town, *Small & Carter* (*8925a p.p.*). Widely distributed in tropical America; Florida.

19. **Ceratolejeunea integrifolia** sp. nov.

Olive green to olive brown, growing in depressed mats: stems 0.06 mm. in diameter, not closely appressed to the substratum, loosely and irregularly pinnate, the branches widely to obliquely spreading, tending to become parallel in old mats, similar to the stem: leaves imbricated, the lobe widely spreading, slightly convex, somewhat falcate, ovate, 0.35 mm. long, 0.3 mm. wide, arching partially or wholly across axis, antical margin strongly outwardly curved to the apex, postical margin straight or slightly curved, forming an obtuse angle with the keel, apex broad, rounded to very obtuse, margin entire or vaguely and irregularly sinuate; lobule conforming to the type normal for the genus,* though sometimes poorly developed, inflated throughout, ovate, 0.1 mm. long, 0.08 mm. wide, keel arched, very slightly roughened from projecting cells, free margin straight or slightly curved when explanate, involute to apex and arched in natural position, apical tooth short and curved, tapering to a blunt point, hyaline papilla in a slight depression, sinus lunulate; cells of lobe plane or a little convex, averaging about 9μ at the margin, 15μ in the middle, and 18 × 15μ at the base, walls apparently uniformly thickened, the pits very indistinct; ocelli mostly two (rarely three to five), situated side by side near base of lobe, measuring about 35 × 16μ: underleaves distant, orbicular, mostly from 0.18 to 0.25 mm. long, broadly cuneate to rounded at the base, bifid about one half with suberect triangular divisions, acute (rarely obtuse) at the apex, and an acute sinus, margin entire or nearly so, rarely with vague indications of rounded lateral teeth: inflorescence dioicous: ♀ inflorescence sometimes borne on a leading branch, sometimes on a more or less abbreviated branch (the latter in extreme cases bearing only one leaf in addition to the bracts), innovating on one

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*See Evans, Bull. Torrey Club **32**: 275. 1905.

side, the innovation usually simple and sterile; bracts obliquely spreading, complicate with a sharp keel, deeply and unequally bifid, the lobe ovate, mostly 0.45 – 0.6 mm. long and 0.3–0.35 mm. wide but sometimes considerably smaller, rounded to acute at the apex, entire or with an occasional tooth, lobule ovate, mostly 0.35–0.45 mm. long and 0.18–0.2 mm. wide, usually coarsely and irregularly one- to three-cleft in the apical region; bracteole slightly connate on one side, ovate, reaching a maximum size of about 0.5 × 0.25 mm., bifid about one half with suberect acute divisions often reflexed at the apex and a narrow sinus, margin entire or very sparingly and irregularly dentate (rarely with more than one tooth on a side): ♂ inflorescence occupying a short branch or terminal on a more or less elongated branch, often proliferating at the apex; bracts mostly in two or three pairs, rarely in four or five, loosely imbricated, strongly inflated with an arched keel roughened from convex cells, unequally to subequally bifid with blunt divisions; bracteole usually single, at base of inflorescence, similar to the underleaves but smaller: perianth and sporophyte not seen. (PLATE 9, FIGURES 13–19.)

On bark. New Providence: Soldiers Road, *E. G. Britton* (*819 p.p.*, *822*); Waterloo, *E. G. Britton* (*721*); Maidenhead Coppice, *E. G. Britton* (*3220*). Specimens from Florida, collected by Rapp near Sanford, on April 12, 1903, and later, should be referred to this same species. No. 721 may be designated the type.

The specimens above described, although destitute of perianths, are so abundant that they give a fairly good idea of the extent to which the species varies. The characters to be emphasized are the following: the dioicous inflorescence, the basal ocelli, the absence of teeth on the leaves, the usually rounded lobes, the small leaf cells with their walls apparently uniformly thickened, the lack of modified lobules (utriculi, etc.), the small underleaves not cordate at the base, the rarity of teeth on the lobes of the perichaetial bracts and on the bracteoles. The leaf cells bear some resemblance to those of the peculiar West Indian *C. patentissima* (Hampe & Gottsche) Evans,* the pits being equally minute and difficult to demonstrate; the cell cavities, however, are sometimes a little more wavy. The variability in the perichaetial bracts deserves a few words of comment. As the figures show, the bract subtended by the innovation is usually distinctly smaller than the other and the lobe is more sharply pointed. In most cases the lobe shows no teeth whatever, but occasionally one or more angular teeth can be distinguished. The condition described for the lobule may be considered typical, but the number of teeth present in the apical region varies considerably and they are not always sharp. In rare cases the apex of the lobule is merely truncate or retuse with blunt angles. When several teeth are present the apical tooth usually projects beyond the others, and the hyaline papilla may be discerned at the bottom of the sinus on its proximal side. The bracteoles vary in much the same way as the lobes, the divisions being usually entire but sometimes variously dentate. On account of the frequency with which the apices of the divisions are inflexed, it is often difficult to observe the peculiarities of the bracteole clearly without dissection.

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* Bull. Torrey Club **32**: 287. *pl. 20. f. 19–26.* 1905.

Among the species allied to *C. integrifolia* it will be sufficient to mention *C. cubensis*. In this plant the lobules, underleaves, bracts, and bracteoles are much the same as in the new species except that the lobes of the bracts and the divisions of the bracteoles tend to be more regularly toothed. The leaf cells, also, are very similar and there are no differences in the ocelli; the cells, however, sometimes show distinct trigones and intermediate thickenings. The autoicous inflorescence of *C. cubensis* and the dentate leaf lobes will at once serve to distinguish it. The teeth are situated in the apical region of the lobes and usually vary from two to five; they tend to be more conspicuous on branch leaves and are occasionally indistinct on robust stem leaves.

20. **Taxilejeunea obtusangula** (Spruce) comb. nov.

Lejeunea (*Taxi-Lejeunea*) *obtusangula* Spruce, Hep. Amaz. et And. 221. 1884.

Pale green, growing among other hepatics or forming loose depressed mats: stems 0.12 mm. in diameter, loosely and irregularly pinnate, the branches widely spreading, usually with smaller leaves than the stem, at least in basal portions: leaves loosely to closely imbricated, the lobe obliquely spreading, more or less convex, not falcate, orbicular-ovate to ovate, 0.6 mm. long and 0.5 mm. wide on robust sterile axes, arching partially across to considerably beyond the axis, antical margin more or less strongly curved from base to apex, postical margin slightly curved, forming a continuous line or a very obtuse angle with the keel, apex broad and very obtuse or, more commonly, abruptly apiculate, margin minutely crenulate from projecting cells and sometimes vaguely angular-sinuate or angular-dentate in outer part; lobule inflated throughout, ovate, 0.12 mm. long, 0.08 mm. wide, keel more or less arched, slightly roughened from convex cells, free margin straight or a little curved, involute to or beyond the apex, the latter (not clearly seen without dissection) consisting of a single straight and slightly projecting cell bearing a hyaline papilla at its proximal base, sinus shallow, two or three cells long; cells of lobe slightly convex on both free surfaces, averaging 16 μ at the margin and $32 \times 18\ \mu$ in median and basal regions, thin-walled but with distinct triangular trigones and occasional elliptical intermediate thickenings: underleaves distant to contiguous, plane, orbicular to broadly orbicular, measuring 0.3×0.35 mm. on robust axes but often much smaller, cuneate at the base on slender branches but typically rounded to cordate, bifid one third to one half with erect triangular divisions, mostly acute at the apex and tipped with a single cell, rarely rounded, obtuse or apiculate, sinus acute, margin entire or slightly crenulate, rarely vaguely sinuate; inflorescence autoicous: ♀ inflorescence sometimes borne on a leading branch, sometimes on a more or less abbreviated branch (the latter in extreme cases bearing only one leaf in addition to the bracts), innovating on one side, rarely on both, the innovation sometimes simple but usually branched and often again floriferous; bracts obliquely spreading, more or less complicate with a blunt keel, lobe narrower than in the leaves, oblong to oblong-lanceolate, 0.6 mm. long, 0.25 mm. wide, narrowed to the acute or obtuse apex, margin slightly crenulate and irregularly sinuate or sinuate-dentate, lobule very variable, averaging about 0.15×0.08 mm., usually ligulate in outline, the apex blunt or sharp and the margin entire or nearly so; bracteole broadly oblong to oblong-quadrate, averaging about 0.5×0.35 mm., bifid about one third with erect or connivent acute divisions and a very narrow sinus, margin minutely crenulate and often irregularly sinuate-dentate, occasionally with one or two sharp lateral teeth; perianth obovoid from a narrow base, 0.65 mm. long, 0.4 mm. wide, often developing a long cylindrical stipe after fertilization, truncate at the apex with rounded angles, terete below, bluntly five-keeled in apical region, beak none, surface more or less roughened from convex cells especially along the keels: ♂ inflorescence occupying a short branch, not proliferating; bracts in two to six pairs, imbricated, delicate in texture (the cells without local thickenings), shortly and subequally bifid with a strongly arched keel and obtuse to subacute divisions; bracteoles restricted to base of inflorescence, minute, orbicular, similar to the underleaves; antheridia borne singly: capsule about 0.2 mm. in diameter; spores greenish, minutely verruculose, about 16μ in short diameter; elaters about 9μ wide. (PLATE 10.)

On rocks. New Providence: Maidenhead Coppice, *E. G. Britton* (*256 p.p.*, *3248*, *3249*); without definite locality, *A. E. Wright* (communicated by W. G. Farlow). The species was described by Spruce from specimens which he collected on the trunks of palm trees in the vicinity of Para, Brazil. These specimens were afterwards distributed in Hepaticae Spruceanae. They tend to be a little more robust than the Bahamian plants but agree with them in all essential respects. No other stations for the species are at present known, although its occurrence is surely to be expected in the Antilles and in other intermediate regions.

The great variability of *Taxilejeunea obtusangula* is one of its striking characteristics, and the fact should be emphasized that the perianths are often borne on slender branches which show the typical vegetative peculiarities of the species much less clearly than robust and sterile shoots. The underleaves and the perichaetial bracts are perhaps the most variable organs. Spruce describes the underleaves as imbricated and cordate. The imbrication, however, seems to be exceedingly rare except near the tips of vigorous branches, and although the cordate condition may be considered typical, the majority of the underleaves are rounded or even cuneate at the base. The bracts are especially variable in their lobules, and there is sometimes a marked difference between the outer bract of an inflorescence and the inner bract, especially when the latter is the only one subtended by an innovation. Under these circumstances the lobule of the outer bract is sometimes very slightly modified and may be inflated in much the same way as on ordinary leaves; the lobule of the inner bract, however, is invariably narrow and plane. In other cases the outer bract, even when no innovation subtends it, shows the same modification as the inner bract. Very frequently the lobule is nothing more than a fold at the base of the lobe and can scarcely be distinguished when the bract is spread out flat. The perianth is remarkable because it develops no beak; it simply contracts at the apex to a small circular opening.

The position of *T. obtusangula* in the genus *Taxilejeunea* is somewhat aberrant, as Spruce has already pointed out. In most of the species which have been referred to this genus the female branch is repeatedly floriferous by innovations and thus gives rise to a sympodial cluster, which bears a series of flowers or perianths along its upper side. In *T. obtusangula* there is no approach to such a condition. The innovation is frequently completely sterile, and even when it is floriferous there is so much space between the two flowers that there is no question of a cluster. The absence of this particular character indicates an approach to the genus *Lejeunea*, but the other characters of the species seem to warrant its retention in *Taxilejeunea*, especially since other species of this genus have been described in which there are no distinct clusters or in which such clusters are only occasionally developed.

21. LEPTOLEJEUNEA ELLIPTICA (Lehm. & Lindenb.) Schiffn. Evans, Bull. Torrey Club **29**: 499. *pl. 23. f. 1–7.* 1902.

On bark. New Providence: Soldiers Road, *E. G. Britton* (*824 p.p.*). Widely distributed in the tropical regions of America, Asia, and the Pacific Islands. Usually growing on living leaves.

22. BRACHIOLEJEUNA BAHAMENSIS Evans, Bull. Torrey Club **35**: 383. *pl. 28. f. 1–14.* 1908.

On bark. Abaco: Old Kerr's Point, *Brace* (*2027 p.p.*). New Providence: Soldiers Road, *Coker* (*1 p.p.*); ten miles west of Nassau, *Coker* (*2*); near Tea House, *E. G. Britton* (*3191*); Grantstown, *E. G. Britton* (*562*); Fox Hills Path, *Britton & Millspaugh* (*2090*); north slope of Blue Hills, *E. G. Britton* (*584 p.p.*). Watlings Island: Cockburn Town and vicinity, *Britton & Millspaugh* (*6120, 6134 p.p.*). Crooked Island: Stopper Hill, *Brace* (*4816*), the type; road to Vauxhall, *Brace* (*4746*). In Coker's list the species appears as *B. corticalis*. Cuba; Florida. The Florida specimens, which have not before been reported, were detected by Miss C. C. Haynes; they were collected by Small and Nash on Old Rhodes Key, south of Miami (*464 p.p.*).

23. BRACHIOLEJEUNEA CORTICALIS (Lehm. & Lindenb.) Schiffn. Evans, Mem. Torrey Club **8**: 131. *pl. 18. f. 1–11.* 1902.

On bark. Great Bahama: Pinder's Point, *Britton & Millspaugh* (*2533*); Barnett's Point, *Britton & Millspaugh* (*2646*);

Golden Grove, *Britton & Millspaugh* (*2719, 2723*). Cat Island: the Bight and vicinity, *Britton & Millspaugh* (*5899*). Tropical America; Florida.

24. LOPHOLEJEUNEA SAGRAEANA (Mont.) Schiffn. Evans, Bull. Torrey Club **34**: 24. *pl. 3. f. 10–20.* 1907.

On bark. Andros: near Nicholl's Town, *Small & Carter* (*8966 p.p.*). New Providence: Soldiers Road, *E. G. Britton* (*818, 824 p.p.*); Waterloo, near old fort, *E. G. Britton* (*2*); Maidenhead Coppice, *E. G. Britton* (*3215 p.p., 3217 p.p., 3250 p.p., 3254 p.p., 3257 p.p., 6554, 6577, 6578*). Widely distributed in tropical America; Florida; also reported from Africa and the East Indies.

25. CAUDALEJEUNEA LEHMANNIANA (Gottsche) Evans, Bull. Torrey Club **34**: 554. *pl. 33. f. 1–12.* 1907.

On twigs. New Providence: Maidenhead Coppice, *E. G. Britton* (*257*). Widely distributed in tropical America; Florida. The Florida specimens have not before been reported; they were collected by Small and Carter near Long Prairie (*2812 p.p.*) and determined by Miss Haynes, who has kindly communicated a portion of the material.

26. MASTIGOLEJEUNEA AURICULATA (Wils. & Hook.) Schiffn. Evans, Mem. Torrey Club **8**: 129. *pl. 17. f. 10–19.* 1902.

On bark and rocks. Andros: near Nicholl's Town, *Small & Carter* (*8967*). New Providence: Mt. Vernon, *Coker* (*7*); Soldiers Road, *E. G. Britton* (*687, 688, 3165, 3169*); Southeast Road, *Coker* (*3*); Waterloo, *E. G. Britton* (*1*); Farringdon Road, *E. G. Britton* (*219, 3260*); Maidenhead Coppice, *E. G. Britton* (*251, 3214, 3250 p.p., 6574*). Widely distributed in tropical America; Florida to Louisiana.

27. ARCHILEJEUNEA VIRIDISSIMA (Lindenb.) Evans, Bull. Torrey Club **35**: 169. *pl. 8. f. 1–8.* 1908.

On bark. Great Bahama: Eight Mile Rocks, *Britton & Millspaugh* (*2605*). Venezuela; Porto Rico; Jamaica.

28. LEUCOLEJEUNEA UNCILOBA (Lindenb.) Evans, Torreya **7**: 228. 1908.

Archilejeunea Sellowiana Steph. Evans, Mem. Torrey Club **8**: 125. *pl. 16. f. 12–20.* 1902.

On bark. New Providence: Soldiers Road, *E. G. Britton* (*666, 3172 p.p.*). Widely distributed in tropical America; Rhode Island south to Florida and west to Texas.

29. LEUCOLEJEUNEA XANTHOCARPA (Lehm. & Lindenb.) Evans, Torreya **7**: 229. 1908. Bull. Torrey Club **35**: 172. *pl. 7. f. 12–23.* 1908.

On bark. New Providence: Nassau, *A. E. Wight* (communicated by W. G. Farlow); Soldiers Road, *E. G. Britton* (*3168*); Maidenhead Coppice, *E. G. Britton, 3247 p.p.*). Widely distributed in tropical America; Africa; Java.

30. FRULLANIA ARIETINA Tayl.

On twigs. New Providence: Grantstown, *E. G. Britton* (*557*). Widely distributed in tropical America; Florida.

31. FRULLANIA GIBBOSA Nees.

On bark. Abaco: Old Kerr's Point, *Brace* (*2022*). New Providence; Soldiers Road, *Coker* (*18 p.p.*); Waterloo, *E. G. Britton* (*3 p.p.*); Maidenhead Coppice, *E. G. Britton* (*3247 p.p.*); Lake Cunningham, *E. G. Britton* (*645 p.p.*); near Tea House, *E. G. Britton* (*3194*); near Clifton, *E. G. Britton* (*739 p.p.*). Widely distributed in tropical America: Alabama.*

32. FRULLANIA OBCORDATA Lehm. & Lindenb.
Frullania caroliniana Sulliv.

On bark. New Providence: Soldiers Road, *E. G. Britton* (*820 p.p., 3164 p.p.*); Maidenhead Coppice, *E. G. Britton* (*3247 p.p.*); Lake Cunningham, *E. G. Britton* (*645 p.p.*); Grantstown, *E. G. Britton* (*565 p.p.*); Rifle Range Coppice, *E. G. Britton* (*561 p.p.*). Tropical America; Florida to Louisiana.

33. FRULLANIA RIOJANEIRENSIS (Raddi) Spruce.

On twigs. New Providence, *E. G. Britton* (*557*). Widely distributed in tropical America.

34. FRULLANIA SQUARROSA (R. Bl. & N.) Dumort.

On bark. Great Bahama: near Eight Mile Rocks, *Brace* (*3718*). Berry Islands: Lignum Vitae Cay, *Britton & Millspaugh* (*2330*). New Providence: Mt. Vernon, *Coker* (*9*); Soldiers Road, *Coker* (*11*),

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*According to Stephani, Species Hepat. **4**: 344. 1910. This is the first record for the United States.

E. G. Britton (*823 p.p.*, *3164 p.p.*, *3167*, *3172 p.p.*, *3173*); Waterloo, *E. G. Britton* (*6632*, *6639*); Maidenhead Coppice, *E. G. Britton* (*3217 p.p.*, *6553*, *6575*); Lake Cunningham, *E. G. Britton* (*641*); near Clifton, *E. G. Britton* (*739 p.p.*); Carmichael, *E. G. Britton* (*440*, *443 p.p.*); Seven Hills, *E. G. Britton* (*3361*). Eleuthera: near the Bluff, *E. G. Britton* (*6523*). Anguilla Isles: South End, Salt Key Bank, *Wilson* (*8054*). Widely distributed in tropical regions throughout the world; Connecticut to Ohio and south to Florida and Louisiana; Bermuda.

It will be seen from the species listed that the Jubuleae comprise seven eighths of the entire number and that the Metzgeriaceae are as yet unrepresented in the collections made on the Islands. The Anthocerotaceae are not wholly absent. Sterile specimens of an *Anthoceros* allied to *A. levis* L. were collected by Brace along the Adelaide Road, New Providence (*3917*), but it is impossible to identify them without sporophytes. The preponderance of the Jubuleae indicates the tropical character of the hepatic flora. All but five of the species, in fact, are definitely known from the Antilles and all but ten from Florida, numbers that will doubltess be reduced upon further exploration. Most of the species which occur in the Antilles are confined to the lowlands, even on mountainous islands, although a few of them follow the path of civilization into higher altitudes and make their appearance along roadsides and in plantations. It seems rather surprising at first that only five of the Bahamian species are known from Bermuda.* The flora of the more northern island, however, is much more closely related to that of the northeastern United States, even though it does contain certain subtropical elements.

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*See Evans: The Hepaticae of Bermuda. Bull. Torrey Club **33**: 129–135. *pl. 6.* 1906.

Explanation of plates 9 and 10

The figures were drawn by the writer and prepared for publication by Mr. Stanley C. Ball.

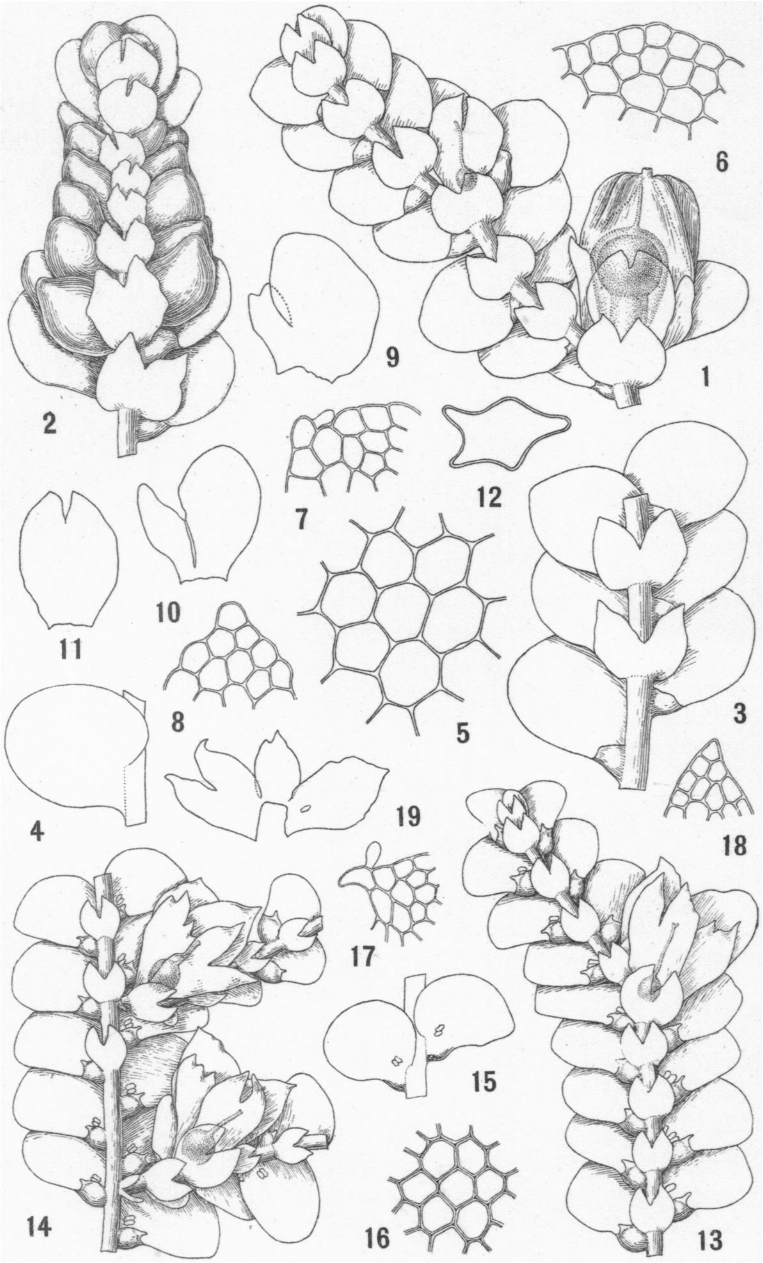
PLATE 9

Rectolejeunea Brittoniae Evans. 1. Part of a branch bearing a perianth with a second female inflorescence on the innovation, postical view, ×35. 2. Part of a leading branch with a male inflorescence, proliferating at the apex, postical view, ×35. 3. Part of a robust sterile branch, postical view, ×35. 4. Leaf, antical view, × 35. 5. Cells from middle of lobe, ×265. 6. Apex of lobe, ×200. 7. Apex of lobule, ×200. 8. Apex of an underleaf division, ×200. 9–11. Bracts and bracteole from a single involucre, ×35. 12. Transverse section of perianth in apical region, ×35. The figures were all drawn from specimens collected by E. G. Britton; FIG. 2, 5, 6, and 7 from *6598*, the others from the type specimen (*692*).

Ceratolejeunea integrifolia Evans. 13. Part of a leading branch with a female inflorescence, postical view, ×35. 14. Part of a leading branch bearing two short branches with female inflorescences, postical view, ×35. 15. Two leaves, antical view, ×35. 16. Cells from middle of lobe, ×265. 17. Apex of lobule, ×200. 18. Apex of an underleaf division, ×200. 19. Bract and bracteole, ×35. The figures were all drawn from the type specimen (*721*).

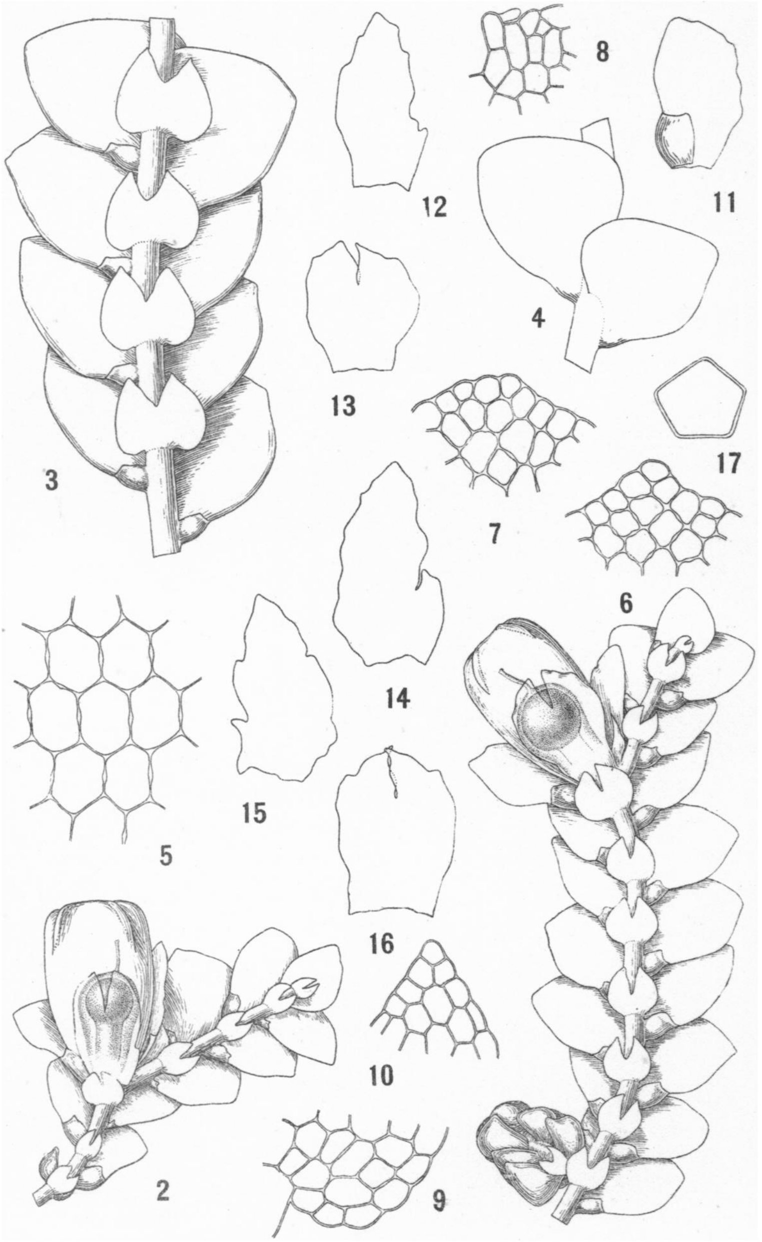
PLATE 10

Taxilejeunea obtusangula (Spruce) Evans. 1. Part of a leading branch with a perianth and a male inflorescence, postical view, ×35. 2. Short branch with a perianth, postical view, ×35. 3. Part of a robust sterile branch, postical view, ×35. 4. Two leaves, antical view, ×35. 5. Cells from middle of lobe, ×265. 6, 7. Apices of lobes, ×200. 8. Apex of lobule, ×200. 9. Cells from base of underleaf, ×200. 10. Apex of an underleaf division, ×200. 11–13. Bracts and bracteole from a single involucre, ×45. 14–16. Bracts and bracteole from another involucre, × 45. 17. Transverse section of perianth above middle, ×35. . The figures were all drawn from specimens collected by E. G. Britton; FIG. 3–10 from *2349*, the others from *256*.



1—12 RECTOLEJEUNEA BRITTONIAE Evans
13—19 CERATOLEJEUNEA INTEGRIFOLIA Evans

HELIOTYPE CO. BOSTON



TAXILEJEUNEA OBTUSANGULA (Spruce) Evans

HELIOTYPE CO. BOSTON